AIR POLLUTION

Scorecard Rates Emission Reductions of Hybrid Vehicles

For all its cachet, you might think that hybrid drivetrain technology is inherently green. But only 13 of 34 hybrid vehicles assessed achieve better than a 25% reduction in greenhouse gas (GHG) emissions, and just 3 exceed a 40% reduction, according to an evaluation by the Union of Concerned Scientists (UCS).[1] Moreover, reductions in GHG emissions do not necessarily correlate with reductions in other toxic emissions.

Like any engine output–improving technology, hybrid technology can boost both fuel efficiency and power—but the more you boost one, the less you can boost the other. That dichotomy spurred the UCS to develop its "hybrid scorecard," which rates each hybrid according to how well it lives up to its promise of reducing air pollution.[2] All the vehicles were from model year 2011 except for one, the 2012 Infiniti M Hybrid.

First the UCS scored each hybrid on how much it reduced its GHG emissions relative to its conventional counterpart, on a scale of zero (least reduction) to 10 (greatest reduction). These scores reflect the percentage in fuel efficiency gain. For example, the Toyota Prius gets 50 mpg[3] compared with 28 mpg for the comparable Toyota Matrix. This represents a 44.0% reduction in GHG emissions, earning the Prius a GHG score of 9.4. At the bottom of the scale, the 21-mpg hybrid VW Touareg reduces GHG emissions only 10% over the 19-mpg conventional Toureg, for a score of 0.0. With a 46% improvement, the luxury Lincoln MKZ Hybrid had the greatest reduction over its conventional counterpart.

The UCS also scored hybrids for absolute emissions (rather than relative to the conventional model) of air pollutants including particulate matter, carbon monoxide, hydrocarbons, and nitrogen oxides. These scores, on a scale of zero (dirtiest) to 10 (cleanest), are based on California certifications for tailpipe emissions. As the scorecard showed, a vehicle that emits less heat-trapping gases may not necessarily emit less of other air pollutants. For example, the Mercedes Benz S400 Hybrid scored 9 on air pollution reduction, alongside the Prius and the Lincoln MKZ, but only 1.3 on GHG emissions.

HYBRID SCORECARD
Top 10 Nonluxury Hybrids
by Total Environmental Improvement Score

Vehicle	Combined mpg[3]	GHG score	Air pollution score	Environmental improvement score
Toyota Prius	50	9.4	9	9.2
Ford Fusion Hybrid	39	6.5	9	7.8
Honda Civic Hybrid	41	5.4	9	7.2
Toyota Highlander Hybrid	28	6.2	8	7.1
Ford Escape Hybrid FWD	32	5.1	9	7.0
Hyundai Sonata Hybrid	37	5.5	8	6.8
Honda Insight	41	4.1	9	6.5
Honda CR-Z	37	3.3	9	6.2
Toyota Camry Hybrid	33	3.2	9	6.1
Nissan Altima Hybrid	33	2.4	9	5.7

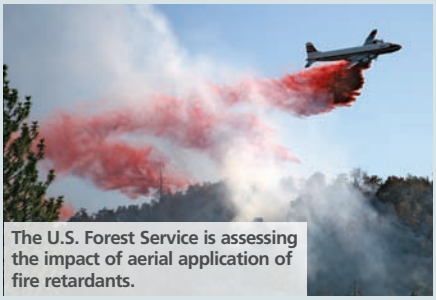
Publication of results does not imply endorsement by *EHP* or by the National Institute of Environmental Health Sciences of any car brands or models listed.

The Beat

by Erin E. Dooley

U.S. Forest Service Examines Fire Retardant Policy

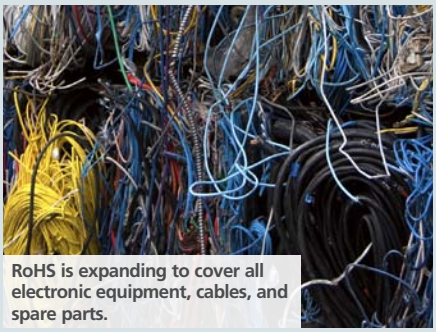
As fire season in the western United States peaks, the U.S. Forest Service is incorporating public comments into a draft environmental impact statement (DEIS) published earlier this year.[1] The DEIS was developed in response to a July 2010 ruling by Montana's Federal District Court that U.S. Forest Service protocols for aerial application of fire retardants to fight wildfires violated the Endangered Species Act. Although aerial application in remote areas is not considered a direct threat to human health—the smoke from wildfires is deemed a greater hazard[2]—it does carry the risk of inadvertent contamination of waterways and traditional food sources. A final EIS is expected by the end of 2011.



The U.S. Forest Service is assessing the impact of aerial application of fire retardants.

Teen Hearing Loss Linked to SHS

A new study shows that children aged 12–19 years exposed to secondhand smoke (SHS) were nearly twice as likely as nonexposed teens to experience sensorineural hearing loss, a type of hearing loss typically associated with aging and congenital deafness.[3] Exposed teenagers performed worse across every sound frequency tested, especially those frequencies vital to understanding speech. Most of the teens with hearing loss were unaware of the deficiency. The researchers point out that although the effects are subtle, they still may be serious enough to impair learning in classroom settings. More than half of all U.S. children are estimated to be exposed to SHS.[4]



RoHS is expanding to cover all electronic equipment, cables, and spare parts.

EU Expands Rules on Electronic Equipment

In July 2011 a new extension to the Restriction on Hazardous Substances (RoHS) directive on electronic equipment entered into force in the European Union.[5] The extension, which will be phased in by 2019, broadens the scope of the original directive to include all electronic equipment, cables, and spare parts. The extension continues the ban of lead, mercury, cadmium, hexavalent

Left to right: Sherri R. Camp/Shutterstock.com; Huguette Roe/Shutterstock.com

"Hybrid technology doesn't add additional challenges [to reducing exhaust pollutants] that can't be addressed through design of the vehicle's emission controls," says Don Anair, senior vehicles analyst at the UCS. "Numerous manufacturers of hybrids are meeting the lowest emissions levels. Hybrid manufacturers who aren't delivering the lowest smog-forming emissions have chosen not to do so."

Each vehicle's air pollution and GHG scores were averaged into a total "environmental improvement score," again with the MKZ and the Prius leading the pack, and the Touareg scraping bottom. The UCS also scored "hybrid value" (the cost of reducing GHG emissions in dollars per percent reduction) and "forced features" (options you must buy with the hybrid whether you want them or not).

Luke Tonachel, vehicles analyst with the Natural Resources Defense Council, compliments the scorecard for illustrating that hybrid technology is not automatically green. He says, "We should improve the efficiency of all vehicles, and [hybrid technology] is just one technology that can get us there if applied with that goal in mind."

Nonetheless, Jamie Kitman, the New York bureau chief for *Automobile Magazine*, questions the wisdom of emphasizing percentage improvement in gas mileage rather than absolute miles per gallon. At 21 mpg, the hybrid Cadillac Escalade 4WD represents a 29% improvement over the 15-mpg conventional model, saving nearly 2 gallons per 100 miles. But the hybrid Escalade is still a gas guzzler, and Kitman says he wishes people would see through the marketing that encourages them to buy SUVs and "crossovers" rather than ordinary cars, which are more efficient than either.

Says Anair, "The scorecard shows that automakers can pair hybrid technology with advanced emission controls to help tackle climate change while reducing the health impacts from breathing polluted air." However, he adds, alluding to the stark variation in how much hybrid technology boosted fuel efficiency, "Not all automakers are delivering on the full promise of this technology."

HYBRID SCORECARD
Top 10 Luxury Hybrids
by Total Environmental Improvement Score

Vehicle	Combined mpg[3]	GHG score	Air pollution score	Environmental improvement score
Lincoln MKZ Hybrid	39	10.0	9	9.5
Lexus CT200h	42	9.1	8	8.6
Lexus HS 250h	35	6.0	8	7.0
Lexus RX 450h AWD	29	5.9	8	6.9
Lexus RX 450h FWD	30	5.6	8	6.8
Cadillac Escalade 4WD	21	5.2	6	5.6
Infiniti M Hybrid	29	5.0	6	5.5
Mercedes-Benz S400 Hybrid	21	1.3	9	5.2
Cadillac Escalade 2WD	21	3.9	6	5.0
Lexus GS 450h	23	1.0	8	4.5

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3. All fuel efficiency estimates listed in this article are combined highway/city ratings determined by the U.S. Environmental Protection Agency.

chromium, polybrominated biphenyls, and polybrominated diphenyl ethers from use in electronics, and offers clearer rules for seeking exemptions to the ban. RoHS applies to any business that sells applicable products, subassemblies, or components either directly or indirectly to RoHS countries.

Casting Nanofiber Nets for Indoor Pollutants

Conventional methods to detect formaldehyde in air can be time-consuming, expensive, and inadequately sensitive. A team of researchers has designed a nanofiber net that, when used as a coating on a device known as a quartz crystal microbalance detector, provides a faster, more sensitive method for measuring low levels of formaldehyde.[6] The new method uses an electrospinning netting technique to deposit polymide membranes on the microbalance, providing a large surface area and high porosity and adhesive force. The nets also may have uses for detecting viruses and bacteria.

Exploring the Potential of *Frankia*

Frankia are nitrogen-fixing bacteria that live symbiotically in the roots of actinorhizal plants. A new study shows these bacteria have the genetic capacity to produce products such as antibiotics, herbicides, and anticancer agents.[7] Researchers used bioinformatic analysis of three strains of *Frankia* to identify dozens of biosynthetic gene clusters—that is, genes used by *Frankia* to manufacture the compounds it needs to survive and thrive. Products have not been observed or characterized for most of these biosynthetic pathways, but this analysis predicts many that are structurally similar to valuable compounds such as vancomycin.

Frankia species offer a potential source of useful compounds.

Louis S. Tisa/University of New Hampshire

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